

## Toilet Trouble: Problem Solving with Invented Tools

### NCSCOS Requirements

#### Kindergarten

**COMPETENCY GOAL 4: The learner will increase his/her understanding of how the world works by using tools.**

#### Objectives

- 4.01 Describe the functions of tools.
- 4.02 Determine the usefulness of tools to help people: scissors, pencils, crayons, paper clips, hammers, etc.
- 4.03 Apply nonstandard units of measure.
- 4.04 Conclude that tools extend human capabilities.

#### First Grade

**COMPETENCY GOAL 3: The learner will build an understanding of the properties and relationship of objects.**

#### Objectives

- 3.01 Determine the many ways in which objects can be grouped or classified.
- 3.02 Classify solids according to their properties:
  - Color.
  - Texture.
  - Shape (ability to roll or stack).
  - Weight (float or sink).
- 3.03 Determine the properties of liquids:
  - Color.
  - Ability to float or sink in water (buoyancy).

### Things to Know

Problem solving skills are critical to all areas of human endeavor. The first step is to identify the problem to be solved: this is not as self-evident as it sounds, especially for very young learners. In this lab, the problems are already defined for the students. As your students work to solve the problems, encourage them to verbalize their thinking. This allows you as the teacher to hear how the children are approaching the problem and may allow them to see flaws in their approach. Gently assist children if they get very frustrated but by and large, frustration can be a good thing. It promotes students to abandon unsuccessful strategies and try new ones. Some students may show a real talent for this kind of problem solving. They may quickly learn to combine tools in order to create the tools they think they need, they will quickly abandon unsuccessful strategies, they will change strategies to suit each goal or they may see real life applications for the tools they create. These students especially should be allowed other opportunities for this kind of thinking, though it may take some creativity on your part to provide it for them.

### Materials

- 12-14 empty milk jugs
- 12-14 paper clips
- 12-14 marbles
- 12-14 uni fix cubes or lego pieces
- 12-14 sets of 'tools' (can vary except ring magnet and modeling clay)
  - 1 clothespin
  - 1 1/2 " dowel
  - 1 pipe cleaners
  - 1 magnet wands
  - 1 ring magnet
  - 1 4"x4" piece of aluminum foil,
  - 1 rubber band
  - 1 marble sized piece of modeling clay
  - 1 plastic fork
  - 1 plastic spoon

**Set Up:**

1. Half fill each jug with water.
2. Set out milk jugs half on tables or place on the floor if the tables are too high for young learners.
3. Drop a paper clip, a marble and a uni fix cube into each jug. These are the objects students must retrieve from the 'toilet'.
4. Set out each 'tool set'.

**Procedure:**

Tell students that the milk jug is a toilet down which a little girl/boy has dropped three objects. List objects. Challenge students to retrieve the objects using the tools provided. They may use the tools any way they wish. However, they must follow these rules:

**It's a toilet...you can't pick it up**

**It's a toilet...you can't tip it over**

**It's a toilet...you can't take any water out of it**

4. Allow plenty of time for exploration and problem solving. Ask students to explain their rationale for any particular combination of tools or problem solving strategy.
5. Tell students that any object they drop down the toilet is one more thing they will have to get back up again.
6. Students should find that no one tool does the job by itself and a single combination tool is unlikely to retrieve all 3 objects.

**Extensions:**

Try new objects in the 'toilet'

Put food coloring in the 'toilet' to make it impossible to see the objects.

Change the tools around, using any thing that looks interesting.

Use a different small mouthed container.

## Student Instructions for older students

# Down the Toilet

1. Look at the milk jug. Pretend it is a toilet and some child has dropped a marble, a paper clip and a uni fix cube down inside. Can you see them?

2. Look at the tools. You can use these tools any way you like to get the objects out of the toilet. However, there are rules.

**It's a toilet...you can't pick it up**

**It's a toilet...you can't tip it over**

**It's a toilet...you can't take water out of it.**

3. If you drop any of the tools down the toilet, you'll have to get them out also so be careful.